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BULLETIN  
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Some Species of *Bidens* found in the United States and Canada

BY K. M. WIEGAND

Several years ago, while collecting in the vicinity of Ithaca, N. Y., the writer found a number of specimens of *Bidens connata*, on which the awns were upwardly barbed. Until recently \* such specimens have been considered to be hybrids with some species of *Coreopsis*, but in the plants in question there were no characters to warrant such an assumption further than the mere fact of the difference in direction of the barbs. It was thought best, therefore, to attempt a study of this group to determine, if possible, the exact affinities of the various forms and the constancy of some of the more important characters. *B. cernua* and *B. laevis*, in Central New York, have also been much confused, mainly, however, because of the presence of the form here distinguished as *B. cernua intermedia*. It was decided on this account to include these two species also in the proposed study.

Since that time a large mass of material has been collected and many field notes have been made from plants growing in various portions of New York State. To supplement this, specimens have been examined from many other localities throughout the United States and portions of Europe and Asia. In September, 1897, the writer was able to separate the *B. connata comosa* Gray as a distinct species, and now the study has reached such a stage as to warrant the publication of all the results.

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\* Britton, Bull. Torr. Bot. Club, 20: 280. 1893.

The value of the different characters from a taxonomic standpoint has, in general, been found to agree with that placed upon them by previous authors. The most important of all is, of course, the achene, and by this one character alone most of the species may be recognized. Very much dependence cannot be placed upon the leaves, because of the unusually great variation produced by environment, through which influence both the size and the incisions are modified. Two other structures, the involucre and the corolla, have, however, been used much more than by previous writers.

The involucre varies principally in the size and number of bracts, and is important for specific distinction rather than to show lines or strains of variation. In this respect it differs from the corolla, in which the pale yellow, 4-toothed character is found practically constant among a number of related species, while the orange, 5-toothed type represents another group, both evidently distinct lines of development. But the corolla does not show all the lines of variation or even the primary ones. To determine these one must look to the achene. The number of awns is found to be much more constant than was before supposed. Only one species, *B. laevis*, really shows a variation in number without a corresponding change in other characters. Some allowance must, of course, be made for the fact that the outer achenes usually show a shortening of the awns which process is often carried so far that some are entirely obliterated.

In determining specific differences the direction of the barbs upon the margins of the achene seems to be of more importance than upon the awns. So far as known, no specimens of species having truly downwardly barbed achenes have been found with upwardly barbed awns; moreover, it seems possible that when erect barbs are found in *B. melanocarpa* and *B. connata* they are to be considered as a continuation of the hairs of the achene out upon the awns, thus excluding the real barbs, and not as a reversal of the barbs themselves. Whether this is really the case has not as yet been definitely settled. In some cases the erect barbs are nearly as slender as the hairs on the achene, but more often they are stouter. The hairs and warts upon the achenes, although more or less characteristic in some species, are not of special diagnostic value.

There has in the past been considerable discussion regarding the occurrence of hybrids among species of *Bidens* and *Coreopsis*. Every specimen, however, which the writer has seen labeled as such differs from one or the other of the supposed parents only in the direction of the barbs upon the awns. Although hybrids might be expected among these annual plants their occurrence is very doubtful.

If the direction of the barbs is not constant among the individuals of one species this character can obviously not be used for the separation of the genera *Coreopsis* and *Bidens*, a fact which has already been strongly emphasized by Dr. Britton. Indeed, a number of species of *Coreopsis* are evidently *Bidens* except for their barbs. The transference of these species to the genus *Bidens* becomes therefore necessary for a correct interpretation of the two genera.

The section PLATYCARPAE, the principal members of which are here treated, should therefore consist of the following species in northern North America: *B. frondosa*, *B. melanocarpa*, *B. discoidea*, *B. connata*, *B. comosa*, *B. bidentoides*, *B. dentata*, *B. cernua*, *B. laevis*, *B. Nashii*, *B. coronata*, *B. trichosperma*, *B. aristosa*, and *B. involucreta*.

The writer wishes to thank Dr. Robinson for kindly loaning the material in the Gray Herbarium, and Dr. Small for loaning that in the Herbarium of Columbia University; also the New England Botanical Club for the opportunity of studying a large amount of material from the vicinity of Boston; and especially Mr. E. P. Bicknell, a critical student of this group, who has generously furnished valuable suggestions and extensive notes upon many of the species.

#### Synopsis of the Species

A. Achenes upwardly barbed on the margins; corolla 4-5-toothed; awns 2; rays small or none.

Outer involucre bracts 4-8, inner oblong, equaling the disk or longer; ovaries of the ray-flowers hairy, minutely awned; achenes narrow, nearly black, hairy, papillose or tuberculate, rarely smooth, margins upwardly barbed to base of awns.

Corolla stramineous, 4-toothed; achenes long and very narrow, awns filiform, upwardly barbed; leaves simple; outer involucre bracts 4-5, inner longer than the achenes.

1. *B. bidentoides*.

Corolla orange, 5-toothed; achenes of ordinary form; leaves pinnate; inner involucre equaling the achene.

Leaves 3-foliolate, leaflets long-acuminate; heads very small (9 mm. broad), on very short peduncles; achenes very small (4.5 mm.), thickish, awns scarcely longer than the breadth of the achene, upwardly barbed; outer involucre bracts 4.

2. *B. discoidea*.

Leaves larger, 3-5-pinnate, leaflets acute to acuminate; heads larger; achenes 6 mm. long; awns half as long as the achenes or more, commonly downwardly barbed; outer involucre bracts 6-8.

3. *B. melanocarpa*.

Outer involucre bracts 10-16; inner ovate-triangular, short; corolla stramineous; heads long-peduncled; ovaries of the ray-flowers glabrous, awnless; achenes broad and flat ( $\frac{1}{2}$  as broad as long) brown, nearly glabrous and smooth (rarely papillose); margins on the upper one-fourth downwardly barbed.

4. *B. frondosa*.

*B.* Achenes downwardly barbed, flat or flattish, brown, glabrous or nearly so, not tuberculate, slightly contracted at the top, awns 2-4; corolla usually stramineous, funnelform; outer involucre bracts 6-8; leaves except in no. 6 more or less petioled.

Rays wanting (or at least not exceeding the disk); corolla 4-toothed.

Achenes of small or medium size (8 mm. or less); awns 2 (except in one var.),  $\frac{2}{3}$  the length of the achene or less; leaves incised or parted.

[*B. tripartita*.]

Achenes large (8-11 mm.; in var. 5-7 mm.); awns 3, over one half the length of the achene; leaves serrate.

5. *B. comosa*.

Ray flowers present, ligule one half longer than the disk; corolla 5-toothed; awns 4 (rarely 2); leaves deeply serrate or incised.

6. *B. dentata*.

*C.* Achenes usually both upwardly and downwardly barbed on the same margin, 4-angled, tuberculate; awns 4 (rarely 3); corolla orange, 5-toothed, abruptly contracted; leaves simple (sometimes deeply lobed); outer involucre bracts 4-7; heads commonly rayless.

7. *B. connata*.

*D.* Achenes downwardly barbed, biconvex or 4-angled, nearly glabrous, tuberculate on the angles, often striate, dark-green or blackish; awns 2-4; corolla deep yellow, 5-toothed, abruptly contracted; outer involucre bracts 8; heads large, often cernuous in fruit; rays commonly long and showy; leaves sessile.

Outer involucre bracts exceeding the disk, unequal, spreading, foliaceous; rays twice the length of the disk or less; leaves long (8-16 cm.), more or less clasping and connate, teeth distant; achenes 4-angled, slightly dilated at the summit.

8. *B. cernua*.

Outer involucre bracts rarely exceeding the disk, nearly equal and seldom conspicuously foliaceous, slightly fleshy; rays 2-4 times the length of the disk; achenes not dilated above, flat, 1-nerved on the outer face; plant sparingly branched above or simple, helianthoid in appearance; leaves shorter, rarely connate (5-12 cm.), teeth closer.

Leaves lanceolate, acute or short-acuminate, sharply serrate, not fleshy, usually tapering at the base; branches spreading; margin of the achene straight from awns to base.

9. *B. laevis*.

Leaves elliptic or oblanceolate-oblong, acute, minutely serrate or almost entire somewhat fleshy, some of the upper often very broad at the base, but rarely clasping; branches strict, erect; achenes slightly contracted at the summit.

10. *B. Nashii*.

1. *BIDENS BIDENTOIDES* (Nutt.) Britton, Bull. Torr. Bot. Club, **20**: 281. 1893

*Diodonta bidentoides* Nutt. Trans. Am. Phil. Soc. II. **7**: 361. 1841.

*Corcopsis bidentoides* T. & G. Fl. N. A. **2**: 339. 1842.

Erect and stout (20–80 cm.), stramineous, glabrous: branches short and spreading: leaves pale, undivided, lanceolate to linear-lanceolate (blade 6–10 cm.), on more or less margined petioles (2–5 cm.), regularly tapering to the acuminate apex, coarsely and distantly serrate-dentate, attenuate at the base, upper leaves shorter and on more margined petioles: heads on rather slender peduncles which are mostly shorter than the leaves, longer than broad (15–18 × 10–12 mm.), stramineous; outer involucre bracts 4–5, linear or linear-spatulate, 1–3 times the length of the disk, not ciliate, entire, erect; inner bracts 5, oblong-linear, barely acute (15 mm.) and with the chaff much longer than the flowers: ray flowers rarely present, ligule strap-shaped, not exceeding the head; the ovaries similar to those of the disk: corolla of the disk flowers pale-yellow, large (5 mm. long,  $\frac{1}{2}$  length of awns), funnellform, 4-toothed, basal portion equaling the upper: stamens rarely exerted: mature achenes very slender, linear-cuneate, convex (8–10 mm.), dark-brown, not papillose, hairy, margins upwardly hairy: awns 2 (rarely a third very short one) very slender and nearly as long as the achene, upwardly barbed.

Muddy shores of the Delaware River and Bay, Pennsylvania to Maryland.

Specimens examined from:—Pennsylvania: Philadelphia, *Durand*. New Jersey: Camden, *Parker*, *Diffenbach*; Salem, *Commons*. Delaware: New Castle, *Canby*; Wilmington, *Canby*, *Commons* (with rays). Maryland: Bush River, *Canby*.

Of all the species of *Bidens* within our limits this is the most limited in distribution. It is, so far as known, confined entirely to the shores of the Delaware River and Bay, where it may be found growing in the mud at tide-water. The species is very constant in its characters as well as very unique, and must be considered as representing a line of development by itself. With *B. discoidea* it agrees only in having upwardly barbed awns and hairy achenes, but is remarkably distinct in the form of the achene and in the corolla. The foliage on the contrary resembles quite closely *B. comosa*. Its affinity seems not to be with any of the species dis-

cussed in this paper. The flowering period is from Sept. 1 to Oct. 15.

2. *BIDENS DISCOIDEA* (T. & G.) Britton, Bull. Torr. Bot. Club, 20: 281. 1893.

*Corcopsis discoidea* T. & G. Fl. N. A. 2: 339. 1842.

Stem tall and much branched, slender, reddish: leaves 3-foliate, small, glabrous, petioles very slender (3 cm.), marginless; leaflets lanceolate to ovate-lanceolate, short (4-9 cm.), long-acuminate, sharply and coarsely serrate below the entire point, abruptly contracted at the base, the terminal on a long slender stalk (5-15 mm.), lateral slightly smaller on shorter stalks, uppermost leaves sometimes undivided, dark-green: heads very small and numerous (8-10 mm. broad), on very short peduncles (1-4 cm.), globular; outer involucre bracts linear to spatulate-linear, rarely longer than the disk, commonly 4, not ciliate, glabrous; inner bracts oblong or elliptic-oblong, obtuse (6-7 mm.), brownish, equaling the disk; chaff commonly reddish tipped: ray flowers none: corolla of the disk flowers very small (1.75-2 mm.), orange, equaling or slightly longer than the awns, campanulate-oblong above, 5-toothed, contracted into a basal portion shorter than the upper: stamens slightly exerted: mature achenes very small (4-5.5 mm.), rather narrow, cuneate, contracted at the summit, biconvex, black, hairy, tuberculate-papillose or nearly smooth, margins upwardly hairy, summit truncate, awns 2, very short (scarcely longer than the breadth of the achene), upwardly hairy.

Massachusetts to North Carolina (*Chapman*) and westward to Ohio, Louisiana and Texas.

Specimens examined from:—Massachusetts: Stony Brook Res., *Rich.* Connecticut, *Wright*, 1879. New York: Ithaca (many specimens); Oswego Co., *Wibbe*, *Rowlee*. New Jersey, Morris Co., *Porter*. Pennsylvania: Luzerne Co., *Heller*, no. 60. Delaware, *Canby*. Maryland, *Canby*. Ohio, *Sullivan*, 1839. Missouri, *Engelmann*. Arkansas, *Letterman*. Louisiana, *Hale*, 1842. Texas, *Lindheimer*, *Drummond*.

This species is on the whole less common in the eastern portion of its range than are most of the others, and judging from the specimens cited above it must be quite rare in New England. In New York and Pennsylvania it is found only near sphagnum bogs and mountain lakes, selecting preferably old logs and stumps that project out into the water. So far as observed it is quite constant

in its characters, and although some cases of retrorse awns have been reported\* none have been observed by the writer. Its only close relative is *B. melanocarpa* from which it is often very difficult to distinguish some of the smaller forms. The smaller, more acuminate leaves, and smaller achenes with upwardly barbed awns are the only reliable distinguishing characters. Some of the western specimens are often quite robust. The flowering period is September and October.

3. *Bidens melanocarpa* sp. nov.

*B. frondosa* Torr. Fl. N. Y.; Darl. Fl. Cest. Not L.

Stem 50–70 cm. high or more, slender, bushy-branched, the branches mostly spreading: leaves pinnately 3–5-foliolate, glabrous or nearly so except the scabrous margins, petioles very slender, scarcely margined (3–4 cm. long); terminal leaflet (4–8 cm. long) lanceolate to oblong-lanceolate, acuminate, tapering into a long stalk (10–15 mm.), occasionally 3-lobed at base, sharply and saliently serrate with either medium or coarse teeth; lateral leaflets about  $\frac{1}{3}$  shorter, less acuminate, more truncate and often very oblique at the base: heads on slender ascending peduncles of medium length, rather small (largest about 15 mm. diameter), hemispherical or globular; outer involucre bracts 6–8, spatulate-linear, mucronate, entire, sparsely ciliate, equaling the disk or sometimes twice as long (10–15 mm.); inner bracts brownish, 8–12, oblong, scarcely acute (8 mm. long), apex slightly pubescent; chaff often reddish-tipped: ray flowers usually present, ligule broadly oval, equaling the disk, golden yellow, caducous, the ovaries narrowly and evenly cuneate, hairy, hairs on the margins in clusters and directed upward, summit convex, awns 2, divergent, scarcely longer than the breadth of the ovary, downwardly barbed: corolla of the disk flowers small (2.5–3 mm.), shorter than the awns, 5-toothed, orange, campanulate-oblong, slightly contracted below, basal portion shorter than the upper: stamens exserted: achenes in fruit (6 × 3.25 mm.) cuneate, slightly contracted at the summit, flattish, costate, nearly black, tuberculate, sparsely hairy, margins upwardly hairy to base of awns, summit truncate: awns short ( $\frac{1}{3}$ – $\frac{1}{2}$  length of achene), slender, slightly divergent, strongly downwardly barbed (rarely barbs erect).

New Brunswick to Florida, westward to Texas and Nebraska.

Specimens examined from:—New Brunswick: *Chalmers* (*ex* Macoun). Maine: *Parlin*; *M. E. Hill*, no. 93. New Hampshire:

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\* Britton, Bull. Torr. Bot. Club, 20: 280. 1893.

*W. Deane*; *Robinson*, no. 361. Massachusetts: *Boott*; *Collins*; *Rich*; *French*; *Young*. Rhode Island: *Thurber*. New York: *A. M. Vail*; *Kearney*; *Britton*; *Rowlee, et al.* New Jersey: *Torrey*; *Commons*; *Halsted*, no. 36. Pennsylvania: *Smith* (upwardly barbed awns). West Virginia: *Millsbaugh*, no. 778. Florida: *Chapman*. Alabama: *Buckley*. Louisiana: *Halc.* Texas: *Lindheimer*; *Reverchon*. Missouri: *Bush*, no. 167; *S. Weller*. Illinois: *Wolf*; *DeForest*. Nebraska: *Rydberg*, no. 1707; *Clements*, no. 2894.

***Bidens melanocarpa pallida* var. nov.**

Slightly glaucous, branches all ascending or erect, conspicuously overtopping the terminal shoot: leaves smaller, on shorter more margined petioles (3–4 cm. long), dull, veins inconspicuous, the lower ternate, the upper undivided; leaflets shorter, ovate-lanceolate, short-acuminate, the terminal contracted at the base into a winged stalk and more or less confluent with the lateral, coarsely and sharply few-toothed: heads longer than in the type, on longer peduncles; outer involucre erect, foliaceous (2–4 times length of head), rarely ciliate; inner bracts oblong lanceolate: corolla of disk flowers larger (3–4 mm.), often 4-toothed, more nearly yellow, shorter than the awns: achenes (5–10 mm.), not papillose: awns longer (about  $\frac{1}{2}$  length of achene).

Nova Scotia to New York and Illinois.

Specimens examined from:—Nova Scotia: *Halifax*, *Brother Peter*, 1896. Illinois: *Wolf*. New York: *Ithaca* (many specimens).

This species is quite widely distributed throughout the eastern portion of North America, and is everywhere very abundant. In the New England states it seems to be the most common type of the *frondosa* group, but in New York State and farther westward *B. frondosa*, with which it has so long been confused, is equally abundant. It usually prefers rich damp soil and forms a large part of the vegetation along roadsides, in waste places, and on the margins of rivers and ponds during the autumn months. In structural characters it is more distinct than are *B. cernua* and *B. laevis*, but has nevertheless never been separated from *B. frondosa*. It is however much more closely related to *B. discoidea*.

*B. melanocarpa* is exceedingly variable. When growing in exposed localities it often has much narrower leaflets and is 5-pinnate, but when in shaded places the leaves are usually only 3-pinnate

and leaflets very broad. In the vicinity of sphagnum bogs it often becomes more bushy, with smaller leaves and more acuminate leaflets, in which condition it resembles *B. discoidea* very closely. The specimens with upwardly barbed awns collected by various botanists and thought to be hybrids between this species and *B. discoidea* or *B. bidentoides* can scarcely be considered as such since they do not show the necessary intermediate condition of other characters. In fact, with the exception of the barbs, all the characters are identical with those of this species. It seems better for the present to consider them as accidental forms of *B. melanocarpa*.

*B. melanocarpa* cannot be distinguished from the other species of North America by any one character. From *B. frondosa* it differs by its fewer involucre bracts, narrower upwardly barbed achenes and orange flowers; from *B. connata* by its 2-awned achenes and pinnate leaves; from *B. discoidea* by the larger, less acuminate leaflets, and larger more tuberculate and longer-awned achenes and more numerous involucre bracts. It is very closely related to *B. tripartita* of the Old World, some of the broader leaved forms of which differ only in having blunter teeth and downwardly barbed achenes with yellow corollas. It seems to form a transition between *B. tripartita* and *B. connata* on the one hand and between *B. discoidea* and *B. connata* on the other.

The var. *pallida* although widely distributed, judging from the specimens representing it in the larger herbaria, seems not to be very common. In the vicinity of Ithaca, N. Y., however, it is abundant along the shores of Cayuga Lake, where its habit makes it quite conspicuous. In many respects the reduction of the leaves and lengthening of the peduncles suggests a condition similar to that which in *B. connata* and *B. comosa* was determined to be a "second growth," but here the plants seem to be perfectly normal and healthy. Moreover they differ in some important structural characters regarding the head and achenes, and in the long branches overtopping the terminal head. Considering the character of the heads and achenes alone, it might almost be taken for a hybrid with *B. comosa*, but the leaves and general habit are not at all intermediate. It seems best at present to consider these forms as forming a distinct variety. The flowering period of *B. melanocarpa* is from Aug. 15th to Sept. 25th.

4. *BIDENS FRONDOSA* L. Sp. Pl. 832. 1753.

Also of Willd. (in part); Torr. Fl. N. U. S. (in part); Bigelow Fl. Bost.; T. & G. Fl. N. A.

Stem tall and branching, glabrous, furrowed, reddish, branches spreading: leaves pinnately 3-5-foliolate (commonly 5-) on slender marginless petioles (2-4 cm. long), scarcely paler beneath, glabrous or nearly so, the straight veins prominent; leaflets lanceolate, tapering evenly to the very acute apex, serrate, with numerous sharp or bluntish regular teeth, all abruptly contracted at the base and short-stalked, the lateral oblique; rachis narrowly margined: heads large (15-25 mm. broad), broader than high, on long stout peduncles (3-16 cm.); outer involucre bracts linear or narrowly spatulate, unequal, numerous (10-16), scarcely exceeding the disk (rarely twice as long), conspicuously ciliate, entire; inner bracts brownish-olive, 14-18, mostly ovate or narrowly triangular, often abruptly contracted at the pubescent apex, mostly shorter than the disk: ray flowers usually present, ligule elliptic-oval, equaling the disk, pale yellow or often whitish, caducous, the ovaries (5-6 mm.  $\times$   $1\frac{1}{2}$ -2 mm.), cuneate, broader and shorter than in *B. melanocarpa*, slightly contracted at the summit, truncate, awnless, entirely glabrous except occasionally a few upward barbs on the margins near the summit: corolla of the disk flowers of medium size (2.5-4 mm.), funnelform, pale yellow, 4-5-toothed, not conspicuously contracted below, two thirds length of awns, basal portion shorter than the upper: stamens usually included: achenes in fruit large, very flat and broad (7.5-9 mm.  $\times$  4.5-5 mm.), cuneate, slightly contracted at the summit, brown or olivaceous, smooth or merely papillose, nearly glabrous, 1-nerved on each face, margins downwardly barbed on the upper fourth, hairs erect below, summit truncate, awns 2, erect or divaricate,  $\frac{1}{2}$  length of the achene or more, strongly downwardly barbed.

Ontario to North Carolina, Missouri and westward to California and British Columbia.

Specimens examined from:—Ontario: Hull, *Macoun*, 1889. New York: *Barrett*, *Britton*, *DuBois*, *Townsend*, *Wiegand*, et al. Pennsylvania: *Moser*. Kentucky: *Short*. Virginia: *Curtiss*. Illinois: *DeForest*. Wyoming: *Nelson*, no. 2749. Upper Platte, Torr. Herb. California: *Bidwell*, no. 328. Washington: Columbia River, *Suksdorf*, nos. 412 and 1591.

***Bidens frondosa puberula* var. nov.**

Branches, leaves and involucre more or less finely crisp-pubescent, with whitish hairs, the last often densely so; inner bracts

pubescent on the back ; leaves somewhat more finely and bluntly serrate.

Wisconsin and Missouri to the Saskatchewan.

Wisconsin : Green Bay, *J. H. Shutte* ; Devils Lake, *Morgan*. Nebraska : *Webber*, 1886 ; *Clements*, no. 2894, 1893. Missouri : Courtney, *Bush*, no. 29, 1892. Saskatchewan, *Bourgeau*, 1857.

*Bidens frondosa* is common throughout the Middle and Western States, but does not seem to appear in New England. In late autumn it forms a very conspicuous part of the vegetation along roadsides and in waste places, especially where the soil is rich and damp, and may be found in flower from Aug. 15 to Sept. 15 or rarely until Oct. 1.

The plants produce ray flowers in considerable abundance in the earlier heads. They are, however, very caducous, and mostly absent altogether in the later heads ; as a result of which a patch bearing rays early in the season may appear entirely rayless at a later period. Very few plants, if any, are entirely destitute of rays.

Considerable difficulty has been experienced in deciding whether Linnaeus' plant was of this species or the preceding. The original description which is rather longer than usual characterizes the leaves as pinnate and linear, seeds one half narrower than long, peduncles longer than the leaves ; all of which indicate this species rather than *B. melanocarpa*.

*Bidens frondosa* is perhaps the most distinct of all the species in structural characters, although not in general appearance. Its two nearest relatives are *B. melanocarpa* and *B. tripartita*, from the former of which it may be distinguished by the longer peduncles, larger number of involucre bracts, the deltoid inner ones, the pale yellow corolla, form of the sterile ovaries of the ray flowers, and the broad, smooth, brown achenes, and from the latter by the pinnate leaves, long peduncles, outer and inner involucre, 5-toothed corolla and broad achenes.

*Bidens tripartita* L. of the Old World properly belongs here. It is closely related to *B. melanocarpa* and somewhat intermediate between that species and *B. frondosa*. Through it also *B. melanocarpa* is connected with *B. connata*, *B. comosa* and *B. cernua*. The typical form has 3-parted leaves and coarsely serrate divisions with the teeth usually rather blunt ; but the variations are very great

and without doubt several species are now aggregated under one name. A simple-leaved pale form from central Europe with often only 3 awns and large foliaceous involucre is difficult to distinguish from some forms of *B. comosa*, and is probably the *B. tripartita integra* of Koch. Another simple-leaved form with small heads and corky-thickened 2-awned achenes from southern Europe and Asia is *B. tripartita tenuis* DC. A third form with comose often cernuous heads, incised sessile leaves and two awns connects this species with *B. cernua* and has been separated as *B. platycephala* Oersted.

*B. tripartita* is found throughout Europe, Asia and Japan, but so far has not been found in North America (Addison Brown reported it as a ballast plant at Hunter's Point in the vicinity of New York City, Bull. Torr. Bot. Club, **16**: 357. 1879).

5. *BIDENS COMOSA* (A. Gray) Wiegand, Bull. Torr. Bot. Club, **24**: 436. 1897.

*B. connata* DC. Prod.; T. & G. Fl. N. A.; Torr. Fl. N. U. S. (in part); Darl. Fl. Cest.

*B. connata comosa* A. Gray Man. 261. 1867 [ed. 5].

Pale throughout: stem stout, erect (30–80 cm.), glabrous, stramineous or sometimes reddish, internodes rather short; branches short, spreading; leaves undivided (8 cm. long), pale green, narrowly elliptic or elliptic-lanceolate, acute, attenuate at the base into a short strongly margined petiole, serrate with rather small regular teeth (rarely coarser ones, and the upper nearly entire): heads not numerous, large (12 mm. high  $\times$  12–18 mm. broad) nearly globular or broader, on short stout peduncles thus often appearing clustered, erect; outer involucre bracts 6–8, linear or linear-lanceolate, mucronate, usually entire, very large, conspicuous and unequal, 2–5 times the length of the disk (30–50 mm. long), nearly erect; inner bracts oblong-ovate to ovate-lanceolate, acutish, stramineous, about 8 in number: ray flowers wanting: corolla of the disk flowers large (5 mm.), narrow funnelform, pale yellow, 4-toothed, gradually contracted into a basal portion which is longer than the upper, equaling the awns: stamens and style included: mature achenes large and flat (8–10 mm.  $\times$  3 mm.) scarcely carinate, cuneate with a broad base, slightly contracted at the summit, dark olive-green or brownish, not papillose and glabrous or nearly so, often dark-punctate, margins strongly retrorsely barbed, summit convex; awns 3, long and conspicuous (two long ones  $\frac{2}{3}$ – $\frac{3}{4}$  length of achene, third shorter, rarely a fourth very minute), erect, retrorsely barbed.

Maine to West Virginia, westward to Minnesota and Colorado and from Western Georgia (Chapman), Louisiana.

Specimens examined from :—Maine : Orono, *Fernald*. Massachusetts : Revere, *H. A. Young*. New York : *Torrey*, *Britton*, *Hulst* (many from central N. Y.). New Jersey : *Parker*, *Nash*. West Virginia : near Bucklin, *Pollock*. Tennessee : *Ruth*, no. 32. Kentucky : *Short*. Ohio : *Werner*, *Lea*, no. 167 (Torr. Herb.). Illinois : *Chapman*, *DeForest*. Minnesota : *Holzinger*. Kansas : *Norton*, no. 281, Riley Co. Missouri : *Bush*, no. 167 (in part). Louisiana : *Hale*. Colorado : Lincoln Co., *Rydberg*, no. 190.

***Bidens comosa acuta* var. nov.**

Habit as in the type, but leaves sessile or nearly so : heads much broader (broader than high, 10–20 mm. broad) and achenes more spreading ; outer involucre bracts only twice the length of the disk or less, conspicuously spreading, lanceolate, acute and apiculate ; inner narrowly triangular-lanceolate, acute.

Kansas and Missouri.

Specimens examined :—Kansas : Manhattan, *Norton*, 1892. Missouri : *Engelmann*, St. Louis, 1866. Missouri : *Bush*, no. 164, Jackson Co. ; nos. 31 and 49, Courtney Co.

*Bidens comosa* is common throughout the Middle States and Mississippi Valley growing preferably in rather dry soil. Its usual habitat is along roadsides where the soil is rich, or on the sandy margins of lakes and rivers.

When growing undisturbed it often becomes so numerous as to form dense patches to which the pale upright stems and short branches give a characteristic appearance. Certain specimens however from widely separated localities (the *Short*, *Hale* and *Werner* specimens cited above, and others) present an entirely different aspect. The stems are decumbent at the base ; the leaves are shorter, blunter, more sparsely and bluntly toothed or the upper entire ; and the involucre of the long-peduncled heads is very foliaceous, with broad obtuse bracts. At first it seemed proper to separate this form as a distinct variety, but in the study of specimens from the vicinity of Ithaca similar plants were found but apparently always as a second growth after the main stem had been injured or cut away by the mower. It may be possible that the similar variation in *B. connata* is from a like cause. The same variation also occurs in the var. *acuta*.

*B. comosa* is distinguished from all other American representatives of the genus by its broad, 3-awned, retrorsely margined achene; from *B. connata* it differs also by its short branches, stout peduncles, pale leaves, very foliaceous involucre of usually more numerous bracts, and long pale 4-toothed corolla with included stamens; from *B. bidentoides* by the three downward-barbed awns and flat retrorse achenes; and from *B. cernuus* by the 5-toothed corolla, included stamens, 4-awned and angled achene, and by the erect heads. The flowering period is from September 1st to October 1st.

Its closest affinity is however with *B. tripartita integra* Koch (3-awned) a native of central Europe. This variety can be distinguished from the "second growth" American plants only by the slightly shorter involucre, smaller, slightly narrower, and thicker achenes with shorter awns. Through *B. tripartita* the American plant is connected with *B. frondosa* and *B. connata*, and through *B. platycephala* of Europe with *B. cernua*.

#### 6. *Bidens dentata* (Nutt.)

*B. chrysanthemoides* Hook. Fl. Bor. Am. 1: 314. 1833.  
(According to T. & G.) Not of Michx.

*B. quadriaristata dentata* Nutt. Trans. Amer. Phil. Soc. II. 7: 368. 1841.

*B. cernua elata* T. & G. Fl. N. A. 2: 352. 1842.

Stem very stout (40–100 cm.), glabrous or sparsely hirsute, branches short or the upper longer and ascending; leaves pale, often very large (8–18 cm. long), broadly lanceolate, oblanceolate, or oval, acute or short acuminate, contracted at the nearly sessile base, coarsely serrate, incised or rarely even parted, upper leaves nearly as large; heads few (1–3), large and nearly sessile, broader than high (20 mm. diam.); outer involucre bracts about 8, linear to oblanceolate, usually longer than the head, very unequal, some often very foliaceous and incised, conspicuously ciliate below; inner bracts elliptic-ovate, acutish; ray flowers present, ligule one half longer than the disk, oval, pale yellow, the ovary broadly oblong, glabrous except the strongly retrorse margins, awnless; corolla of the disk flowers large (4–5 mm.) funnellform, gradually contracted below, 5-toothed, deep yellow; achenes large and rather broad (3 × 8 mm.), flat, glabrous, brownish, broadly cuneate, slightly contracted at the summit; margins sparsely retrorse with small barbs the lowermost of which are often erect, summit concave:

awns 4 (rarely 2) unequal, about one half the length of achene, retrorsely barbed.

British Columbia near Vancouver.

Specimens examined:—De Fuca, *Scouler*. N. W. Coast, in Gray Herb. from Hooker. Vancouver Island, *Macoun*, no. 73.

This very distinct species, although collected for the first time many years ago, is represented in the herbaria by only a very few specimens. The three cited above are quite similar in general appearance and are characterized by the numerous large pale leaves which are often conspicuously incised, and among which at the summit of the stem the one to three broad and nearly sessile heads are borne. These in form are much like those of *B. cernua*, but they are erect, the rays are pale and very short, and the involucre is more foliaceous. The achenes are however quite unlike those of *B. cernua*, but are so similar to those of *B. comosa* as to sometimes render it difficult to distinguish the two species from this character alone. In structural characters this species seems to stand almost intermediate between *B. cernua* and *B. comosa* on the one hand and between *B. cernua* and *B. frondosa* on the other. It resembles the *B. bullata* L. of Europe which however has rayless heads, hairy stem and leaves and always two-awned achenes.

7. *BIDENS CONNATA* Muhl. Willd. Sp. Pl. **3**: 1718. 1804. Pursh  
Fl. Am. Sept.; Torr. Fl. N. U. S.?

*B. tripartita* Bigelow, Fl. Bost. 294 [ed. 2].

*B. petiolata* Nutt. Jour. Acad. Philad. **7**: 99.

*B. tripartitus* var. *fallax* Warnstorf, Verh. d. Bot. Verein d.  
Prov. Brand. **21**: 157. 1879.

*B. decipiens* Warnstorf, Oesterr. Bot. Zeitschr. **10**: 392. 1895.

Stems tall and moderately branched (5–14 dm. high), glabrous and purplish, internodes rather long, branches usually spreading: leaves undivided or some of the lower ones deeply parted near the base, lanceolate, elliptic-lanceolate, or elliptical, large (12–35 mm. × 70–130 mm.), acuminate, tapering at the base, coarsely and saliently serrate with sharp teeth, bright-green, the petiole slender (2–4 cm. long), scarcely margined, or sometimes short and margined: heads of medium size, slightly broader than high (broadest 15 mm.), on rather short peduncles; outer involucral bracts 4–5, linear or spatulate, rarely much exceeding the disk, not ciliate; inner bracts about 8, brownish, oblong-ovate to elliptic-oblong, mostly

obtuse (7–8 mm. long): ray flowers rarely present, ligule golden-yellow, oblong, one half longer than the disk, ovary short and broad, awnless, hairy: corolla of the disk flowers of medium size (2.5–3.5 mm.), equaling the awns, upper portion oblong, 5-toothed, abruptly contracted into a lower portion which is as long as the upper: stamens exserted: mature achenes (4–6 mm. long), cuneate, very slightly contracted at the top, outer 3-angled and often 3-awned, inner 4-angled and 4-awned, dark-green or black, covered with brown or yellow warts, slightly hairy, barbs on the margins either erect or retrorse even upon the same achene, summit slightly convex; awns  $\frac{1}{3}$ – $\frac{1}{2}$  the length of the achene, downwardly (rarely upwardly) barbed.

Massachusetts and New Hampshire to Virginia and westward to Missouri and Minnesota.

Specimens examined from:—Massachusetts: *Rich, Collins, Booth, Williams, et al.* New Hampshire: *Deane*. Rhode Island: Providence, *Thurber*. Connecticut: *Eaton* (with rays). New York: *Townsend, Vail, et al.* (many from Ithaca). Ontario: Lake Erie, *Macoun*; St. Catharines, *McCalla*. New Jersey: *Torrey; Nash*. Virginia: *Curtiss*. Ohio: *Selby*, no. 6 (up-barbed). Illinois: *Wolf*, no. 155; *Hall*. Missouri: *Bush*, no. 36. Minnesota: *Taylor*.

BIDENS CONNATA PINNATA Watson, A. Gray, Man. Bot. 284. 1890  
[ed. 6].

Stem rather stout (40–70 cm.), much branched from near the base: leaves pinnately divided into from 4 to 6 pairs of narrowly linear (10–20 mm. long), acute, entire or incised distant divisions: heads numerous, similar to the type; chaff reddish tipped: achenes small, blackish, nearly smooth; awns slender, downwardly barbed as are also the margins of the achenes.

Vicinity of St. Paul, Minnesota.

Specimen examined: Richfield, Minn., *Couillard*, (type). (Also Ramsey Co., *Sandberg*, Minn. Bot. Stud., p. 572.)

*Bidens connata* is apparently confined entirely to the Northern States and is not found in the South as has heretofore been supposed. The southern plant seems in all case to be *B. comosa* instead. *B. connata* is very common throughout New England, the Middle States and the Mississippi valley, growing preferably in very wet soil, and is characteristic of ditches and wet swamps.

This species is one of the most variable of the whole group almost all portions of the plant being subject to change. In New England the leaves are shorter petioled, while in the West the petioles are often very long (4 cm.). Some specimens from the Eastern and Middle States have much narrower, nearly sessile leaves. Specimens from Ithaca, N. Y., and Ohio (Selby) as well as one in the National Herbarium collected by Dr. Vasey near Washington have upwardly barbed awns but other characters the same as in the type. At Ithaca these upwardly barbed plants grow over a considerable area almost to the exclusion of the normal form; but many transitional specimens were found in which the awns bore barbs extending in either direction. In addition to these variations one often finds in sphagnum bogs and especially on decaying logs along the borders of lakes, pools and slow-flowing streams a very small form (5–20 cm.) bearing one or two few-flowered oblong heads, and small, spatulate-oblong, petioled, nearly entire leaves. However, when the place of growth becomes more congenial it seems to pass directly into the normal form.

A very interesting form is the var. *pinnata* Wats. from Minnesota. It seems to have a very limited range, being confined to two or three localities in the vicinity of St. Paul. The pinnately finely divided leaves and smoothish achenes make it a very conspicuous plant and almost specifically distinct. The limited distribution at first suggested its being a hybrid; but no other species is known that could give such a combination of characters with *B. connata*. It should be looked for in other districts of the West.

The question as to whether Muhlenberg's type was really this species or *B. comosa* is a somewhat perplexing one. It seems, however, to be now quite definitely settled that the present interpretation is correct, both from a study of the original description, and from specimens which Prof. Ascherson has compared with the Muhlenberg material at Berlin, and which the writer has had an opportunity to examine through the kindness of Dr. Robinson.

*B. connata*\* has in recent years found its way into Europe.

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\* The literature upon the occurrence of *B. connata* in Europe is as follows:

Warnstorf, Verhand. d. Bot. Verein. d. Prov. Brandenb. 21: 157. 1879. Oesterr. Bot. Zeitschr. 10: 392. 1895; 12: 475. 1895. Bot. Gaz. 25: 58. 1898.

Ascherson, Verhand. d. Bot. Verein. d. Prov. Brandenb. 37: L. 1895; 38: LIII. 1896. 39: XC. 1897.

First reported in 1879 by Warnstorf from a locality in Germany (as *B. tripartita fallax*), it was later found in other localities by the same person, and is now known to be widely spread over Central Europe. Along with it was found another *Bidens* identified as *B. frondosa*, then a novelty for Germany, but having many years previously been introduced into Italy. From the description given it is not quite clear whether this is our *B. frondosa* or *B. melanocarpa*, but probably the latter.

*Bidens connata* is closely related to *B. tripartita* of Europe and more remotely with *B. laevis*. In North America it is one of the most distinct of all species of *Bidens*. From *B. tripartita* it may be distinguished by its 4-awned and angled, tuberculate achenia, and orange flowers; from *B. laevis* by the tuberculate achenia, absence of rays and more petioled leaves; and from *B. melanocarpa* by the 4-awned achenia and usually simple leaves. The flowering period of this species is from September 1 to October 1.

#### 8. BIDENS CERNUA L. Sp. Pl. 832. 1753

Also Willd. Sp. Pl.; Pursh, Fl. Am. Sept.; Bigelow, Fl. Bost.; Fl. Dan. *pl.* 841; DC. Prod.; Torr. Fl. N. U. S.; T. & G. Fl. N. A.; Gray, Synop. Fl. N. A.; Macoun, Cat. Can. Pl.

*B. cernua minima* Willd. Sp. Pl. 3: 1717. 1804.

*B. minima* Huds. Fl. Ang. 310. 1762; L. Sp. Pl. 1165, ed. 2; Fl. Dan. *pl.* 312.

Pale throughout: stem rather low (20–70 cm., rarely a meter), erect, glabrous, stramineous or reddish, sometimes sparsely hispid; branches short, rarely exceeding the subtending leaves, decreasing in length down the stem: leaves long and narrow, undivided, lanceolate or linear-lanceolate, sessile and more or less connate by a broad base, only slightly contracted below the middle, acuminate, serrate with coarse acute spreading distant teeth (or in coast plants, with smaller teeth) (6–16 cm. long): heads very large especially in fruit (disk 1.5–2.5 cm. broad), broader than high, before anthesis erect, becoming strongly cernuous in fruit, on short rather stout peduncles (2–4 cm.), often appearing clustered; outer involucre about  $1\frac{1}{2}$ –3 times the length of the disk, bracts 7–8, obtusish, unequal, entire, linear or linear-lanceolate, spreading or reflexed; inner bracts about 8, ovate-oblong or oval, acutish, olive-yellow; chaff rarely if ever colored: ray flowers usually present, ligule pale or bright yellow, about  $\frac{1}{2}$  longer than the disk, narrowly

elliptic, obtuse, caducous, ovaries short and broadly-oblong, glabrous except the strongly retrorse margins, summit truncate and without awns : corolla of the disk flowers large (4–5 mm.), pale or deep yellow, longer than the awns, campanulate-oval above, very abruptly contracted into a lower portion which is longer than the upper, 5-toothed : stamens slightly exserted : achenes small (5–6 mm.), olive, narrowly cuneate, slightly dilated at the summit, glabrous, margins strongly, almost serrately retrorse-barbed, rarely tuberculate except on the margins, strongly carinate on both faces (almost 4-angled), carinae retrorse, summit convex ; awns 4 ( $\frac{1}{2}$  length of achene), straight, retrorsely barbed.

Nova Scotia (*Macoun*) and Canada to North Carolina, Missouri and westward to the Pacific coast.

Specimens examined from :—Maine : *Fernald* (bog form); *M. E. Hill*, *Parlin*. Canada : Port Arthur, *Britton*; P. E. I., *Macoun*; Quebec, *Berg*; Ont., *McCalla*, *Scott*. New Hampshire : *Deane*, *Robinson*, no. 400. Massachusetts : *Rich*, *Collins*. Rhode Island : *Thurber*, *Olney*. New York : *Kearney*, *Dudley*, *DeForest*, *DuBois*, *Townsend*, *Schrenk*. New Jersey : *Parker*, *Britton*. Delaware (? *Tatnall*, awns 2). Virginia : *Curtiss*. Maryland : *Shriver*. North Carolina : *Huger* (Waynesville). Tennessee : *Ruth*. Illinois : *Chapman*, *DeForest*. Missouri : *Engelman*. Lake Superior : *Loring*. Wisconsin : *Gillman*. Wyoming : *Nelson*, no. 1707. Montana : *Scribner*, no. 108. Saskatchewan : *Bourgeau*. Oregon : *Lyall*. Washington : *Suksdorf*, no. 1592. British Columbia : *Macoun*, no. 458. California : *Michener* and *Bioletti*.

### ***Bidens cernua elliptica* var. nov.**

*B. cernua*, in part, of many authors.

*B. chrysanthemoides* Pursh, Fl. Am. Sept.; Torr. Fl. N. Y. (in part); Darl. Fl. Cest.; Macoun, Cat. Can. Pl.

*B. chrysanthemoides* var. ♂ T. & G. Fl. N. A. 2: 353. 1842.

? *B. cernua Coreopsis* Willd. Sp. Pl. 1716. 1804; Pursh, Fl. Am. Sept.

? *Coreopsis Bidens* L. Sp. Pl. 908. 1753. In part.

Plant much larger than the type (.5–1.5 m.), and more bushy-branched, the branches often exceeding the leaves, those at the middle of the stem longest : leaves larger (10–18 cm.  $\times$  2–4 cm.), elliptic-lanceolate or elliptical, acuminate, conspicuously tapering toward the base which is but slightly connate, more evenly and

closely serrate: heads as in the type but more numerous: rays variable but commonly longer than in the type ( $1\frac{1}{2}$ –2 times length of disk).

Massachusetts to Kentucky, and westward to Kansas and the Pacific coast.

Specimens examined from:—Massachusetts: *Tuckerman*, *Faxon*, *Chambers*, *Swan*, *Collins*, *Young*, *Frohock*. Connecticut: *Eaton*. New York: *Stewart*, *Wiegand*. New Jersey: *Haxamer* and *Maier*. Pennsylvania: *Brinton*. Kentucky: *Short*, *Kearney*: no. 475. Illinois: *Bebb*, Kansas, Riley Co., *Carleton*. Wyoming: *Nelson*, no. 2724. British Columbia: *Macoun*, no. 457. Washington: *Suksdorf*, no. 932, 933. Oregon: *Cusick*.

***Bidens cernua integra* var. nov.**

Large and stout, resembling var. *elliptica*, but the large leaves are not so much narrowed at the broad connate base, and are minutely serrate or nearly entire.

Missouri and Nebraska.

Specimens examined:—Missouri: Jackson Co., *Bush*, no. 165 and no. 34. Nebraska: Hooker Co., *Rydberg*, no. 1697; at Ainsworth, *Clements*, no. 2920.

*Bidens cernua* is one of the most widely distributed species of the genus, and is found throughout Europe and Asia as well as across the entire northern portion of North America. It grows preferably in very damp situations or in water, and in most parts of the eastern United States may be found abundant in ditches, along the borders of wet swamps, and especially on the muddy banks of lakes and rivers.

It is exceedingly variable in stature, foliage and length of involucre and rays. Numerous specimens also connect the type with *B. laevis* by an almost complete chain of intermediate forms. The essential characters of these two species are almost exactly the same, and one must depend for specific distinction on those characters to which is due the difference in general appearance. However, certain lines can be drawn which are fairly distinct, and in the interest of clearness it seems much better to break up the group as has here been done.

The specimens representing the typical form resemble very

closely those of Europe, although more commonly radiate. They are all plants of low or medium stature, having large, more or less clustered heads with rays scarcely longer than the disk, sometimes entirely wanting; and what is more important, long, linear-lanceolate leaves, broad at the base and acuminate, with distant teeth. The heads are somewhat paler in color and the lower are on short branches close to the stem.

The plants may flower when very small and dwarf. Such specimens usually have a large involucre and shorter more entire leaves. In addition, there is a bog form analogous to the one described under *B. connata*. These plants grow on floating logs and in *Sphagnum*, and are very dwarf (4-14 cm.), with very small (2-4 cm.) spatulate entire leaves. On the other end of the log, however, may be larger specimens easily recognized as normal. This form is possibly the *B. minima* of Hudson, but in this country at least it is evidently not to be distinguished from the type.

A comparatively distinct form has been separated as var. *elliptica*. The large size of the plant, the broader leaves tapering at the base and closer serratures together with the longer rays has led to its being included often with the next species, but a comparison of the specimens shows that it is much more closely related to *B. cernua*. The shorter rays and foliaceous involucre are the best characters by which it may be separated from *B. laevis*.

*B. cernua*, like many other species of the genus which enter the confines of Missouri, has undergone variation. The form here described as var. *integra* is very distinct in appearance, and constant enough to warrant its separation. The flowering period of *B. cernua* is from Aug. 10 to Oct. 15.

9. BIDENS LAEVIS (L.) B.S.P. Prelim. Cat. N. Y. 29. 1888.

*Helianthus laevis* L. Sp. Pl. 906. 1753. Pl. Gronov.

*Bidens chrysanthemoides* Michx. Fl. Bor.-Am. 2: 136. 1803.

Also of Willd. Sp. Pl.; DC. Prod.; Elliot, Fl. S. C.; Torr. Fl. N. U. S.; T. & G. Fl. N. A. var.  $\alpha$  and  $\gamma$ .

*Bidens quadriaristata* DC. Prod. 5: 595. 1836.

*Coreopsis Bidens* Walt. Fl. Car. 215. 1788.

? *Coreopsis perfoliata* Walt. Fl. Car.

Stem (.5-1 m. tall) glabrous, tinged with purple, erect, branches

ascending, longer than the leaves and all borne above the middle of the stem : leaves simple, small or of medium size (7–13 cm.) lanceolate or more commonly elliptic-lanceolate, glabrous, scarcely paler beneath, more or less contracted toward the sessile base, rarely clasping, acute or short acuminate, serrate with small inconspicuous teeth, rarely the upper slightly connate : heads of medium size (disk 15–22 mm. broad) on long (3–10 cm.) slender pedicels, globular or rarely in fruit broader than high ; outer involucre bracts 7–8, equaling or but slightly longer than the disk, bracts linear to spatulate-linear, slightly ciliate or glabrous, nearly equal, slightly fleshy, obtusish, appressed or spreading, often crisp-wavy in drying ; inner bracts about 8, oval, stramineous, equaling the disk ; chaff usually reddish-tipped : ray flowers present, the ligule very large (2–3 cm.  $\times$  8–14 mm.), elliptical or oval, rounded at the apex, golden-yellow : ovaries short-oblong, glabrous except the retrorse margin, summit truncate, awnless : corolla of the disk flowers deep-yellow, large (4.5–5 mm. long), equaling or exceeding the awns, campanulate-oval above, very abruptly contracted into a basal portion which is slightly longer than the upper, lobes 5, spreading : stamens long-exserted : achenes in fruit (6–9 mm. long) evenly cuneate from the summit, not dilated at the top, glabrous, flattish or rarely slightly carinate on one face, strongly and almost serrately retrorse on the margins, olive-green, convex at the summit : awns 2–4,  $\frac{1}{2}$ – $\frac{2}{3}$  the length of the achene, downwardly barbed.

Massachusetts to Georgia (?) along the coast, and in Central New York. Possibly also in Mexico.

Specimens examined from :—Massachusetts : *Boott* ; Essex Co., *Oakes* ; Dedham, *Harris* ; Acton, *Swan* ; Andover, *Young* ; Rhode Island : *Thurber*. New York : Cayuga Marshes, *Clinton* ; Oswego Co., *Rowlee* ; Torr. Herb. (N. Y. ?). New Jersey : *Poggenburg* (?) ; Hudson Co., *Hexamer* and *Maier* (anomalous) ; *Brinton*. Delaware : *Britton*, *Tatnall*. Virginia : *Hollick* and *Britton*. North Carolina, *Dinwiddee* at Raleigh.

*B. laevis* as here limited contains a group of very similar forms. They are characterized by a more slender habit than *B. cernua*, and more ascending branches all near the summit of the stem ; the leaves are smaller, the involucre bracts decidedly shorter and thicker, and the achenes are less strongly carinate ; but what is still more important, the whole plant when in flower has a distinctly helianthoid appearance quite distinct from *B. cernua*. The character as to whether the heads are cernuous or not is of some-

what questionable value. In the present species they are often slightly nodding in fruit. Many specimens named *B. laevis* in the herbaria are simply plants of *B. cernua* just coming into flower at which time the heads of that species may also be erect.

Recent botanists have substituted the name *B. laevis* L. for the *B. chrysanthemoides* of Michaux. Whether this should be done or not depends on one's attitude regarding the interpretation of Linnaean names. The recent practice has been to interpret the species of Linnaeus as far as possible by his citation of the older authors; and indeed in many cases this is the only way in which the species can be recognized. But in this case it is found that while the unusually long description of *Helianthus laevis* is contradictory to a conception of *Bidens*, the figure of Gronovius there cited represents without doubt the *B. chrysanthemoides* Mx. However, notwithstanding this contradiction, it seems preferable even here to apply the custom of interpretation by citation, and consequently the name *B. laevis* has been used in this paper.

*B. laevis* is really a coast plant and except in one or two instances seems never to penetrate far inland. The New York specimens indicate that this species also is a member of the little community of coast plants growing isolated in Central New York, and of which *Listera australis* is a member. The most southerly specimens examined were from North Carolina, but it seems probable that the species extends even as far as Georgia. The flowering period is from August 15th to October 5th.

Although this species normally has an involucre scarcely exceeding the disk, two or three large coarse plants with leaves 16 cm. long from New Jersey (Centre Square, *Brinton*), and Delaware (Wilmington, *Tatnall*) have bracts approaching those of *B. cernua* in length and foliaceous character; but the achenes are of *B. laevis*.

10. BIDENS NASHII Small, Bull. Torr. Bot. Club, 25: 481. 1898  
*B. chrysanthemoides* var.  $\beta$ , T. & G. Fl. N. A. 2: 353. 1842.

Plant tall and rather stout (30–80 cm.), glabrous and more or less succulent, simple or with a few short erect branches near the summit; internodes often long: leaves ascending thickish (5–12 cm.  $\times$  20–35 mm.), oblong-lanceolate to oblanceolate-oblong, broader than in *B. laevis*, from barely acute to acuminate at the

apex, slightly contracted toward the broad sessile, but scarcely connate base which in the upper leaves is very broad; veins inconspicuous, margins serrate with very fine teeth or nearly entire: heads few or often solitary (disk 15–20 mm. broad), erect or slightly nodding on long erect peduncles (2–7 cm.); outer involucre bracts 8, nearly equal, not exceeding the disk, fleshy, linear to linear-spatulate obtuse, glabrous, appressed or spreading; inner bracts oval acutish; chaff yellow: ray flowers present, ligules very large (15–35 mm. long  $\times$  10–12 mm. wide), elliptic, obtuse, deep-yellow; ovaries oblong, glabrous except the retrorse margins, truncate and without awns: corolla of the disk flowers large (4 mm.), deep yellow, equaling the awns, oblong-campanulate above, abruptly contracted into a slender basal portion, 5-toothed: stamens long-exserted: achenes in fruit small (5–6 mm.) narrow, cuneate, slightly contracted at the truncate or concave summit, flat, 1-nerved on outer face, margins retrorse, almost serrate: awns 2–3 ( $\frac{2}{3}$ – $\frac{3}{4}$  length of achene), erect, retrorsely barbed.

Florida to Southern California.

Specimens examined from:—Florida: *Chapman*, *Nash*, Leon Co., no. 2336. Louisiana: *Hale*, no. 403 (type of T. & G. var.), *Carpenter*. Texas: *Lindheimer*, no. 435; Rio Grande, *Schott*. California: San Bernardino, *Wright*; Los Angeles, *Brewer*, no. 91; San Francisco, *Bolander*, no. 2405.

The three specimens of this species cited by Dr. Small in the original description, from Florida and Louisiana, differ from the Californian and Texan plants only in the less acute leaves, while the essential characters remain the same.

As appearing in the herbarium this species is quite different from *B. laevis* in general appearance, due mostly to its fleshy character, small serratures and broad leaf base. The achenes also seem to be slightly narrowed at the top and truncate after the manner of *B. connata*. The differences seem constant enough to warrant its recognition as a species.

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